

THE OSBORNE/McGRAW-HILL GUIDE TO YOUR

Apple[®] III



Stanley M. Miastkowski

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Stan Mlastkowski

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THE OSBORNE/McGRAW-HILL GUIDE TO YOUR APPLE® III

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Dedication

To my wife Kathe, without whose patience and assistance this book would never have been written.

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Introduction

The book you're holding in your hands is designed to be a *complete* guide to the Apple III personal computer system. The Apple III is a powerful and versatile system that is designed to handle the most involved tasks. For the first time, everything you need to know about setting up and using your Apple III is all in one place. There is no need to continually flip back and forth between numerous manuals.

The first two chapters are an overview of the Apple III and how to make it work. Chapter 1 is a detailed introduction to the system, including a look at the most popular accessories. Chapter 2 explains hooking up the system, getting started, and making backups of your software. It will also be useful to you if you purchase peripherals in the future.

Files are the means by which the Apple III stores and processes data and programs. Chapter 3 explains files, how they're handled, and how to use the Apple III System Utilities. disk.

The Apple III's sophisticated operating system (SOS) is one of the most powerful available in *any* personal computer. Chapter 4 introduces the SOS and goes into detail on how to use the System Configuration Program to customize the SOS to your particular system.

Chapters 5 and 6 are an introduction to Business BASIC, the Apple III's powerful and advanced BASIC interpreter. For people with little or no prior experience with BASIC, Chapter 5 explains the mechanics of using Business BASIC; Chapter 6 eases you into writing your own programs.

If you're an experience BASIC programmer, you can go directly to Chapters 7 and 8. Chapter 7 details the advanced features of Business BASIC that allow you to write professional programs for serious applications. Chapter 8 shows you how to create graphics and music with you Apple III.

The first three appendixes are a comprehensive reference to Business BASIC. Appendix A is a description of every statement and function available in Business BASIC. It's designed to serve as a handy reference once you become familiar with Business BASIC. Appendix B explains Business BASIC's error messages and what to do about them. Appendix C is a full list of Business BASIC's reserved words.

Appendix D covers the Apple III's system error messages, what they mean, and what to do about them. Appendix E is a complete guide to the console, including keyboard codes, cursor and console control keys, screen console codes, and cursor movement options.

Appendix F is a quick reference to creating graphics with your Apple III. It includes a summary of graphic procedures and functions, color codes, and graphics modes.

Appendix G is a summary of the parameters you need to hook up a printer. Appendix H provides detailed information on the Apple III's RS-232-C serial interface. Appendix I is a quick reference to creating music with your Apple III.

The Apple III can also run *Apple II* programs and use many Apple II peripherals. Appendix K details options and limitations of Apple II emulation.

Introducing The Apple III

1

The Apple III personal computer is a sophisticated and versatile system. If you already own an Apple III, we don't have to convince you of this. However, whether you're already the proud owner of an Apple III or are seriously considering buying one, we suggest you read this chapter carefully. Whether the Apple III is your first personal computer or the latest in a series, this chapter is designed to give you a thorough background on the system's features and capabilities.

OVERVIEW OF THE SYSTEM

Figure 1-1 shows a basic Apple III system, including the system unit (the box with the keyboard, disk drive for floppy disks, and electronics) and the Apple Monitor III, a 12-inch video monitor (high-quality television screen).

Figure 1-2 is a picture of what might be considered a "loaded" system. To the basic system shown in Figure 1-1, a second, 5 1/4-inch floppy disk drive, a Profile hard disk (a special type of information storage peripheral that stores the equivalent of 35 floppy disks), a high-resolution RGB (red-green-blue) video display for showing eye-popping color graphics, and a printer have been added. (In this case, the printer is an Epson MX-80 F/T, although nearly any printer will work with the Apple III.)

Your Apple III system probably won't look exactly like either of these,

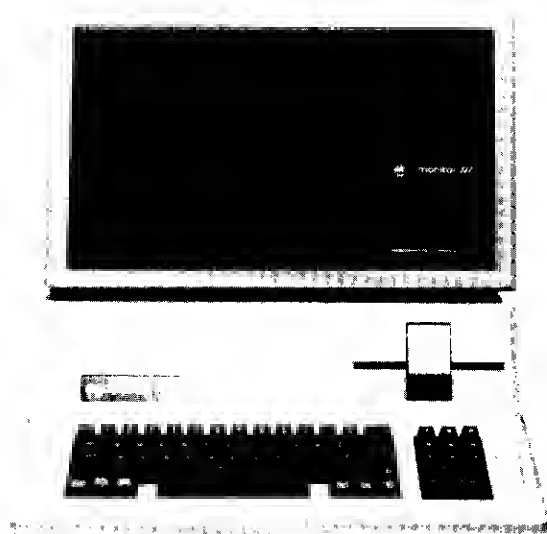


Figure 1-1. Basic Apple III system



Figure 1-2. Expanded Apple III system

since there are many ways to configure a system. The Apple III also comes with either 128K or 256K bytes (1K equals 1024) of program-mable user memory called RAM, for random-access memory. This is where the computer stores programs to be run and the results of its calculations.

There are also four expansion slots inside the case where you plug in accessory circuit boards like controllers for the hard disk drive or a high-speed printer.

No matter how you've customized your system, there will be a number of common features. Of course, there is the Apple III itself, including the built-in keyboard, the floppy disk drive, and the video monitor. In this chapter, you'll get a close look at each of these, some common peripheral equipment, and the software needed to get the system up and running.

THE APPLE III KEYBOARD

Figure 1-3 is a close-up of the Apple III's keyboard. Although it looks like a separate unit, the 74-key keyboard is permanently attached to the main case. If you're an experienced typist, you'll find the Apple III's 61-key main keyboard familiar and comfortable; it's set up similar to a normal typewriter. If you're a touch typist, you'll immediately notice raised dots on the D and K keys to let you know where they are without having to look at the keyboard.

If you haven't used a computer keyboard before, you'll notice several keys that are new. **ESCAPE** and **CONTROL** are special keys you'll use often in the course of using the system. You will normally press **ESCAPE** followed by another key to initiate a command. Another common way to enter commands called control characters is to hold down the **CONTROL** key while typing another character. The use of **ESCAPE** and **CONTROL** depends on the program you are running.

There are also **OPEN APPLE** and **CLOSED APPLE** keys located on the lower left-hand side of the keyboard. They can be programmed to perform special functions that would normally take many keystrokes.

The four arrow keys on the lower right-hand side of the keyboard are used to control the *cursor*—the solid square that appears on your video display and tells you where you're working on the screen.

The majority of the character keys on the keyboard automatically repeat if they are held down for more than half a second. The arrow keys have two auto-repeat speeds. Touch them lightly and the cursor moves slowly; touch them harder and the cursor moves faster.

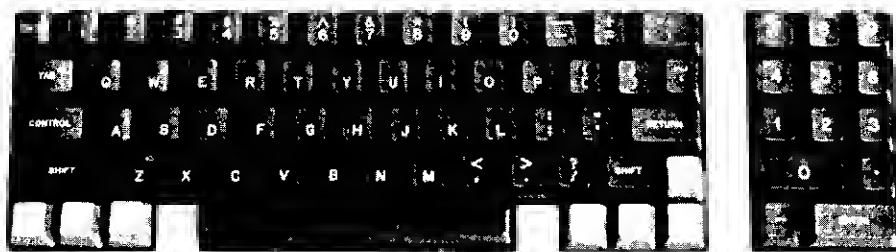


Figure 1-3. Close-up of the Apple III keyboard

A full 13-key calculator keyboard is included for applications where you'll be entering a good deal of numeric information. On the upper right-hand side of the keyboard is the **RESET** key that resets the entire system. (This is known as a *warm boot*.) With the Apple III, a two-key, fail-safe system has been added to make sure you don't accidentally reset the system. When you need to reset the system, you have to hold down the **CONTROL** key and press **RESET**.

FLOPPY DISK DRIVE

Immediately above the keyboard on the right side of the Apple III's main case is the built-in, 5 1/4-inch floppy disk drive (shown in Figure 1-4). This drive stores 140K (143,360) bytes of data on a standard miniature disk (the equivalent of about 35 pages of single-spaced, typed text.) This drive is used for loading the software to get the Apple III up and running—a process called *booting* the system. There are several options for increasing your system's disk storage capacity, which will be detailed later in this chapter.

REAR PANEL

If you're like most personal computer users, you'll find you want to expand your system as you go along. The Apple III makes it easy, since the connectors for the most commonly used accessories are built into the rear of the case. Figure 1-5 shows the Apple III's rear panel. Working from left to right, the connectors are

- A connector labeled **FLOPPY DISKS** for add-on, 5 1/4-inch floppy disk drives. As many as three additional drives can be added.

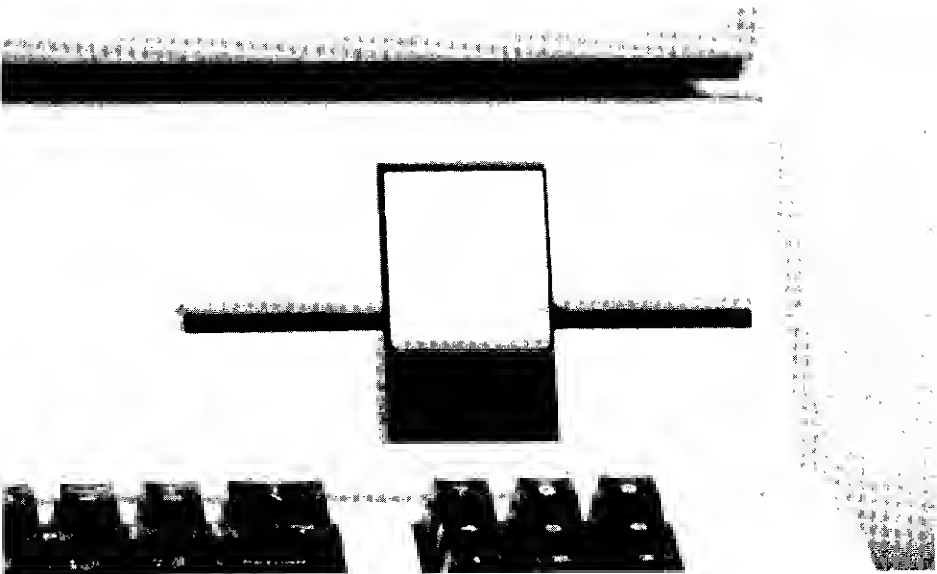


Figure 1-4. Built-in floppy disk drive

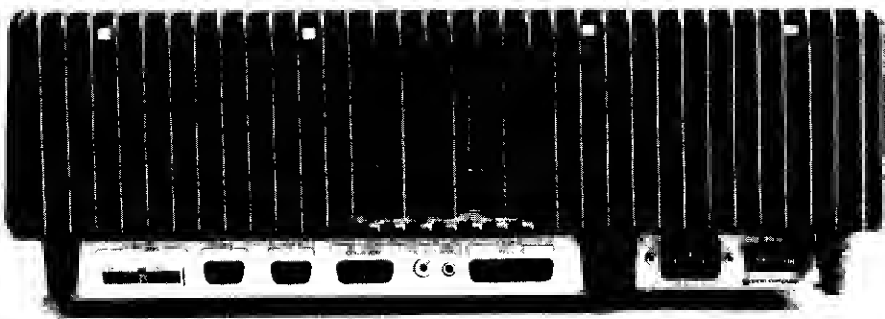


Figure 1-5. Apple III rear panel

- Two connectors labeled PORT A and PORT B for joysticks (for playing games and using special software). The connector marked PORT B is also where an Apple Silentype Thermal Printer is plugged in.

- A connector labeled COLOR VIDEO to which a color video monitor can be connected.
- A connector labeled B/W VIDEO for a black-and-white video display.
- A miniature phone jack labeled AUDIO for connecting an external speaker. (There's also a 2-inch speaker built into the main case.)
- A connector labeled PORT C to the built-in, RS-232-C serial interface. It's used for hooking up a modem (modulator/demodulator) so you can link your computer to other computers over telephone lines. You can also plug serial printers into it.
- A connector marked 120 VAC for connecting the Apple III to the power line.
- The ON/OFF switch for turning the Apple III on and off. The switch is located on the far right.

Notice the four vertical slots in the middle of the rear panel above the connectors. Behind the slots are places to plug in as many as four add-on circuit boards. (In Figure 1-5, two boards can be seen in the slots: a Profile hard disk interface and a parallel interface card for connecting a printer.)

VIDEO DISPLAY

Video monitor, video display, Cathode Ray Tube (CRT)—they're all different terms for what's essentially the same thing—a television screen for reading information (either text or graphics) from the computer. Although you can use a television set as a monitor for the Apple III, it's *not* recommended. A device called an *rf modulator* is required to convert the Apple III's video signal to a signal that a television set can use. The Apple III's high-quality video output requires a high-quality monitor designed specifically for computer use. Most television sets don't have the resolution or circuitry needed to display a full line of 80 characters or high-quality graphics.

Figure 1-6 shows the Apple Monitor III, a video monitor that is capable of displaying high-resolution graphics. It is available in either standard black-and-white or with a green phosphor (the coating on the inside face of the display screen). The green phosphor causes characters to be displayed as light green characters on a dark background and tends to be easier on your eyes. It's highly recommended that you buy the green display if you'll be using your Apple constantly. The Monitor

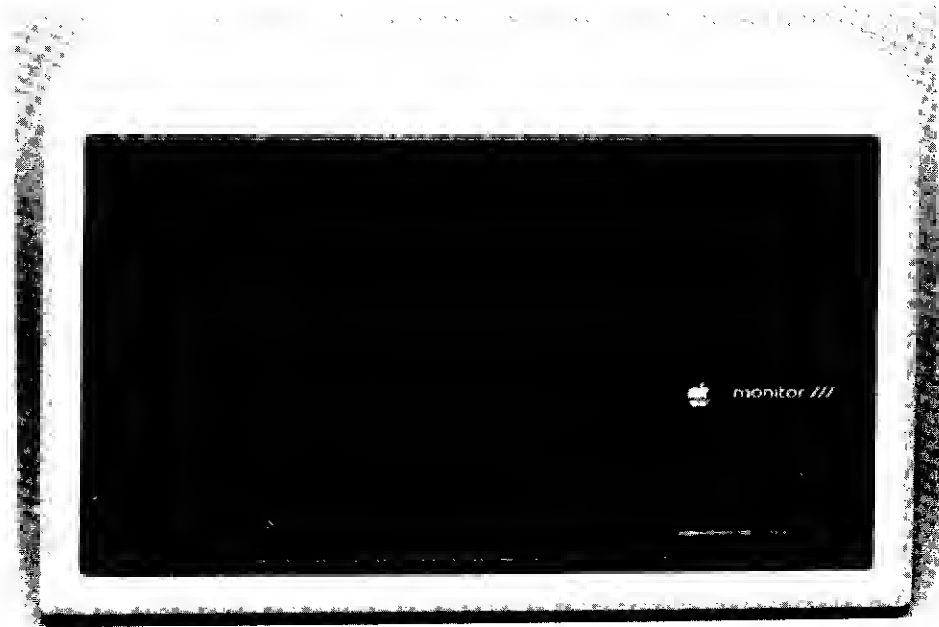


Figure 1-6. Apple Monitor III

III displays a sharp line of 80 characters and the Apple's highest-resolution graphics. If you don't want the Apple Monitor, which is designed to fit nicely on the top of the computer case with the Profile hard disk in between, there are numerous other monitors you can use.

To get the greatest use of the Apple III's outstanding color graphics, you should consider buying a high-resolution color monitor. Although Apple doesn't offer one, many brands are available. There are primarily two types: *composite video* and *RGB*. Composite video monitors are the less expensive of the two and offer high quality at a reasonable price. They can also be used as monitors for video cassette recorders and video games.

RGB (red-green-blue) monitors offer the ultimate in color quality with separate inputs for each of the three primary colors that make up a color television image. They normally can't be used for any other applications. Figure 1-7 shows a typical RGB monitor.

What's on the Screen

The Apple III can display characters and graphics (pictures) in a number of different ways. These displays are called *modes*. In addition,

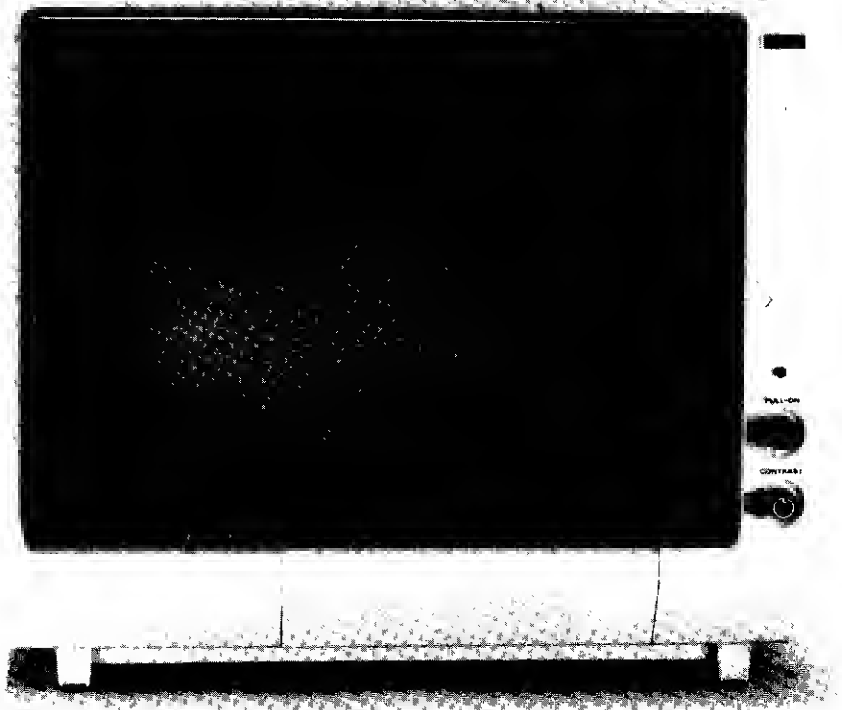


Figure 1-7. RGB color monitor

both upper- and lowercase letters can be displayed without using a special circuit board, making the Apple III ideal for word processing. The three text modes are

- 24 lines of 40 characters each in black-and-white.
- 24 lines of 80 characters each in black-and-white.
- 24 lines of 80 characters each using 16 colors in the foreground and background.

In each text mode, characters can be displayed in either normal or inverse video. Normal is light characters on a dark background, and inverse is dark characters on a light background. Most people find that normal video is the easiest to read and work with.

The Apple III also has four different modes for displaying graphic data (charts, graphs, and so on). Each graphic mode determines the number of pixels (picture elements or individual dots) that are on the

screen at one time. The Apple III's graphics modes have screens that consist of

- 280×192 pixels (53,760 individual points) in black-and-white
- 280×192 pixels (53,760 individual points) in 16 colors
- 560×192 pixels (107,520 individual points) in two colors only
- 140×192 pixels (26,880 individual points) in 16 colors.

INSIDE THE APPLE III

Inside the main case (often called the *system unit*) of the Apple III, lurking behind the keyboard, is the circuitry (the *hardware*) that controls everything the system does. It includes the memory, the microprocessor, the built-in disk drive, and all the wires that allow information to travel from one place to another.

Figure 1-8 shows the Apple III with its “top down.” Admittedly,



Figure 1-8. Inside the Apple III main case

there isn't much to see—just the floppy disk drive (on the left), the speaker, and the four slots for plug-in circuit boards.

The rest of the Apple III's circuitry is encased in the metal enclosure on the left and underneath the keyboard. The enclosure is there for a good reason. It enables the Apple III to conform to the strict RFI (radio frequency interference) standards set by the Federal Communications Commission. Because microprocessors operate at millions of cycles per second, they emit signals that can be picked up by radios and televisions, causing broadcast interference. The metal shield keeps the signals inside the case so you can listen to a radio or have a television on in the background while you're using your Apple III.

Figure 1-9 shows the circuitry inside the system unit.

WARNING: Don't remove the circuit board as we've done for this photograph—it could void your warranty.

To give you an idea of where the board sits in the Apple III case, notice the four slots on the upper left-hand side of the circuit board. They're the same slots you saw in Figure 1-8.

The circuit board is full of integrated circuits (also called *ICs* or *chips*). In each of the ICs are thousands of microscopic circuits. The "brains" of the Apple III, the 8-bit 6502B microprocessor, is the right-most of the three large chips on the bottom of the circuit board. The chips around it and on the rear part of the circuit board work with the microprocessor to process information and store programs and data.

MEMORY

All computers (and your Apple III is no exception) have two kinds of electronic memory: RAM and ROM.

RAM stands for *random-access memory*, although it's more technically correct to call it user programmable read/write memory. This is where the Apple III temporarily stores programs and data. Every time the AC power is turned off, all the information in RAM is lost. By that time, you'll either have printed out your information or stored it on a floppy disk for later use.

The size of computer memory is measured in *bytes*. Each byte consists of eight bits (binary digits or individual 1s or 0s) and can store one character (a letter, number, punctuation mark, or even a space). The size of the memory is stated in "K" bytes (1024 bytes). Depending on which configuration you purchase, the Apple III comes with either 128K (131,072) or 256K (262,144) bytes of RAM.

The amount of available memory points to another of the Apple's solid advantages. Most 8-bit microprocessors can only address (read from or write to) a maximum of 64K (65,536) bytes of RAM. But the Apple III can handle much more because of its sophisticated circuitry.



What's the advantage? Simply put, the more RAM your computer has, the better. The Apple III's huge RAM space is used by much of the sophisticated software sold for the computer. Not only can large programs do more, but with that much RAM available, they can efficiently handle large amounts of data.

In Figure 1-9, part of the RAM is on the top circuit board. Actually, what you see is a 256K system with 128K on the top board and 128K hidden underneath.

That raised circuit board points out another advantage of the Apple III. If you ever decide to expand your 128K system to 256K, your dealer can easily install the memory expansion without the need to use one of the four expansion slots.

ROM stands for *read-only memory*. ROM is a special memory into which information has been permanently stored. Your Apple III has 4K of ROM. Although that's a comparatively small amount, that's all the Apple III needs. Stored in the ROM is special diagnostic software that tests the system every time it's turned on.

Many small computers store their entire operating system and languages like BASIC in ROM. Although using ROM is a convenient way

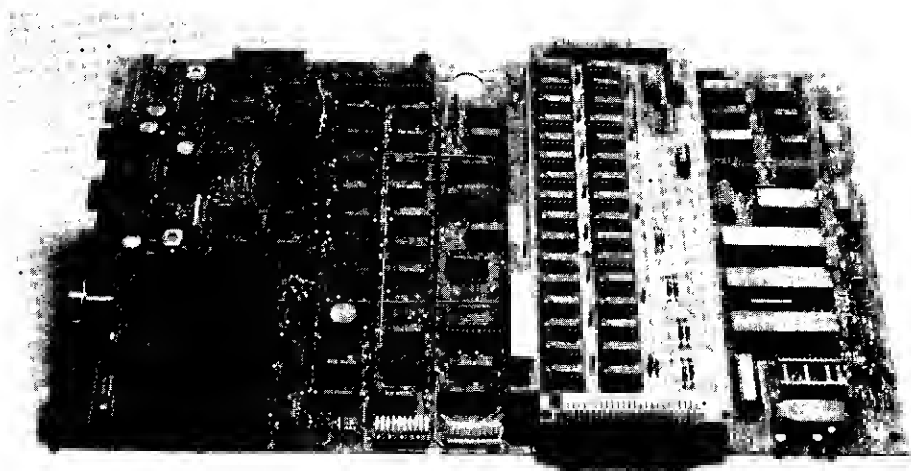


Figure 1-9. Apple III circuit board

to store data, this limits the computer's possibilities. With the Apple III, you load the operating system and whatever language you want to use onto the system from a floppy disk. This only takes a few seconds and makes the Apple III much more versatile. As new and improved versions of the operating system and languages become available, you'll be able to upgrade your system instantly.

SOFTWARE

Now that we've looked at the basic hardware of the Apple III, let's look at *software* (programs). Software is the set of instructions that tells the Apple III what to do. Without software, the Apple III is nothing but a very dumb collection of circuits and wires.

Types of Programs

There are several different types of computer programs. All of them are loaded into the Apple III's RAM from a floppy disk (this is the booting process mentioned earlier).

Applications Programs. These are probably what you think of when you hear the word "program." An applications program is designed to do a specific thing like word processing, accounting, or financial planning. There are hundreds of applications available from Apple and from independent companies for the Apple III. Each differs in the way it works. Our purpose in this book is to explain general operations of the Apple III, not specific applications. Each applications program you buy for your Apple will have specific instructions for using it.

Languages. If you're like many Apple III users, you'll probably be using your computer with pre-written applications programs. But as you experiment more and more with the Apple, you may want to develop customized programs for your own applications.

At the time this book was written, Apple offered three popular programming languages: Apple Business BASIC (Beginner's All-Purpose Symbolic Instruction Code) is the Apple III version of the popular BASIC language; Pascal, an advanced programming language favored by professional programmers; and COBOL (Common Business-Oriented Language), a language used for many business applications programs.

But computers can't directly understand any language. At their most basic level, computers can only understand the combination of 1s and 0s called *machine language*. Two types of special programs called *interpreters* and *compilers* translate programs written in a high-level language

like BASIC or Pascal into machine language. An interpreted language (like BASIC) is translated into machine language each time the program is run. Compiled languages (like COBOL) are first translated into machine language. Since a program written in compiled language is then stored in machine language, it tends to run faster.

Operating Systems. An operating system is an essential program for every computer system. It can be thought of as the "traffic cop" that controls the flow of data into, out of, and through the computer system. An operating system also performs chores like copying data from a disk to memory, getting data from the keyboard, and displaying it on the video monitor.

SOS (Sophisticated Operating System) is the Apple III's operating system. It has many features that until recently were only available in larger computer systems.

In a later chapter, we'll explain SOS in detail. For now, you should know that SOS has to be configured (set up) for your specific combination of Apple III and peripherals. SOS communicates with every part of the Apple III system using *device drivers*, special programs that communicate with peripheral devices. Every time you add a new peripheral you'll have to run something called the System Configuration Program (SCP) to install the proper driver. Your dealer may have already done this for you when you purchased your computer. The configuration process is straightforward, but there's enough involved to devote an entire chapter (Chapter 3) to it.

ADDING POWER

Although the basic Apple III system is powerful and versatile, there are a number of accessories and peripherals that can be added as your needs require.

We've already mentioned video monitors, but both Apple and independent manufacturers offer hardware additions for your Apple.

More Data

As we mentioned earlier, if you purchased an Apple III system with 128K of RAM, you can have it expanded to 256K by your dealer. Whether you need 256K depends on what you'll be using your system for. Most applications programs don't need 256K, but as more and more sophisticated software becomes available, you might find that you will need larger and larger amounts of memory. More memory is necessary for programs that do a lot of numeric calculations.

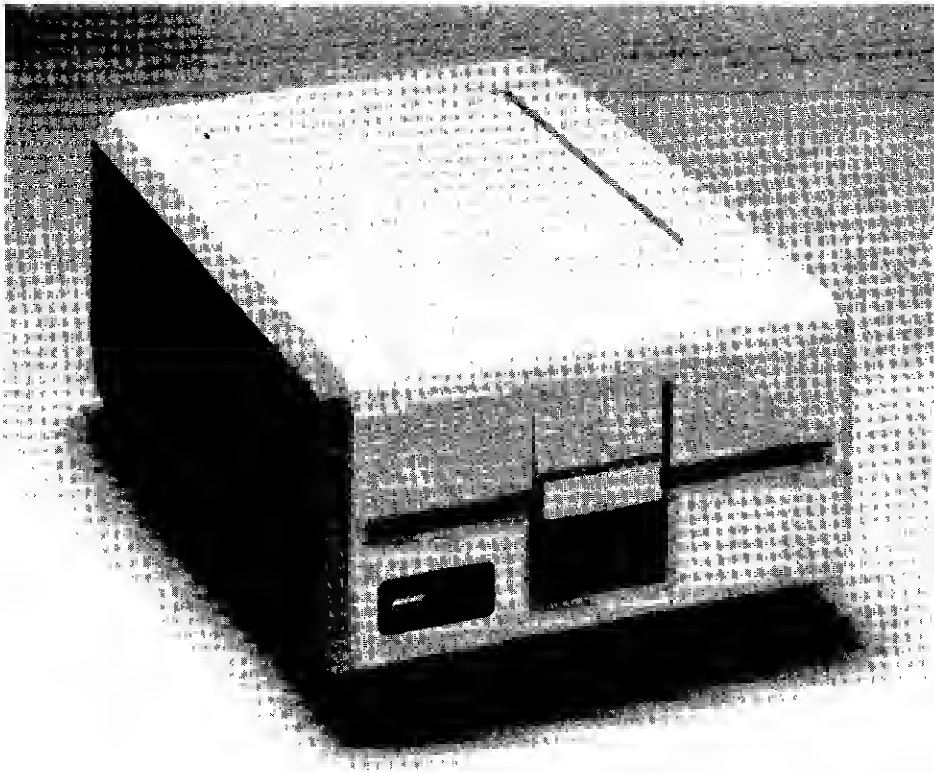


Figure 1-10. Apple Disk III

Floppy Disks

Most people find that they're rather limited by the single floppy disk drive included with the Apple III. Not only do some programs require a second disk drive, but having a second drive makes copying disks much easier. Otherwise, you have to keep swapping disks into and out of the single drive.

Apple offers several alternatives. The Apple Disk III (shown in Figure 1-10), is an add-on, floppy disk drive that's identical to the disk drive built into the Apple. It can read and write exactly the same amount of data. It plugs directly into the back of the computer and doesn't require modification of your operating system. As many as three additional Disk III units can be connected to the Apple III.

The Apple Unifile and Duofile are high-capacity, floppy disk drives. The Unifile contains one disk drive and the Duofile has two. They can

store large amounts of information on a single 5 1/4-inch floppy disk. The disks that fit into the Unifile and Duofile are special and are not interchangeable with the floppy disks that fit into the Apple III's built-in disk drive. Because of the special disks and the special hardware in the drives, each disk can hold 871K bytes of data, as opposed to 140K for the normal disks. (To put that in some perspective, 871K is the equivalent of over 200 pages of single-spaced, typed text.) If you'll be using your Apple III for applications that require a good deal of information storage, like word processing or accounting, the Unifile and Duofile are lower-cost alternatives to the Profile hard disk.

Cassettes

There's no place on the Apple III where you'll be able to hook up a cassette recorder. You don't need one. (The Apple III has a built-in floppy disk drive.) Besides, cassette recorders are far from being the most convenient way to store and retrieve data. If you have used a cassette recorder with a computer, you'll soon see the advantages of using floppy disks.

Profile Hard Disk

The ultimate in information storage for the Apple III is Apple's Profile hard disk drive, shown in Figure 1-11. A *hard disk* is just that—a hard (as opposed to floppy) disk. Rather than a thin piece of plastic

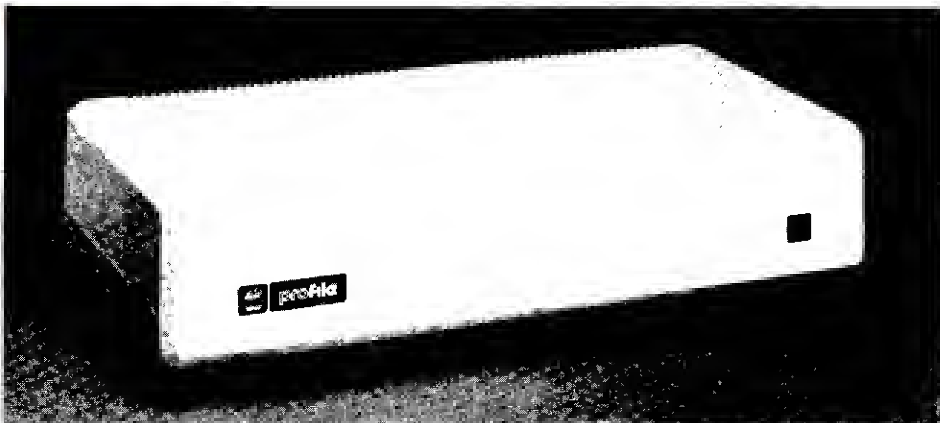


Photo courtesy of Apple Corporation

Figure 1-11. Apple Profile hard disk drive

coated with magnetic material, a hard disk is a magnetically-coated aluminum platter. It's sealed in an air-tight enclosure where the air is continually circulated and filtered. Because of the microscopic tolerances involved, an airborne particle of dust or smoke can destroy the information on the disk.

Hard disks (often called "Winchesters") can't be removed from the drives, but they make up for that disadvantage by storing a *huge* amount of information. A single Profile disk can hold 5 megabytes (a megabyte equals 1,024,000 bytes) of data. That's equivalent to over 1200 pages of single-spaced text. In addition to storing enough data for even the largest application, the Profile disk spins at a much higher speed than a floppy disk and can get information into and out of the computer much faster.

When you look at a hard disk on a cost per byte of storage basis, it becomes a cheap alternative if you're using the Apple III for an application that requires lots of data (for example, writing novels or keeping track of hundreds of customers).

Admittedly, the Profile disk is comparatively expensive, as is any hard disk, but if you need the storage capacity, it can't be surpassed.

Printers

Printers are an important part of any system. It's almost impossible to do without them. The problem is often the choice. There are literally hundreds available, ranging in price from a few hundred dollars to several thousand dollars.

Apple offers three printers for the Apple III: a low-cost thermal printer that requires special paper, a dot-matrix printer, and a more expensive daisy-wheel printer that produces output identical to a high-quality office typewriter. In between are many printers from many manufacturers.

What you need in a printer is largely dependent on what you're doing with the Apple III. If you're word processing and need to send out professional letters or manuscripts, a daisy-wheel printer is almost a necessity. If you're doing financial work like accounting or forecasting, you might want a high-speed printer that can print reams of reports in a short time.

A good compromise is one of the many medium-speed, high-quality dot-matrix printers now available. An example is the Epson printer, shown in Figure 1-12. Like many printers in its price range, it has several modes of operation, which range from fast printing to slower printing with a higher quality image.

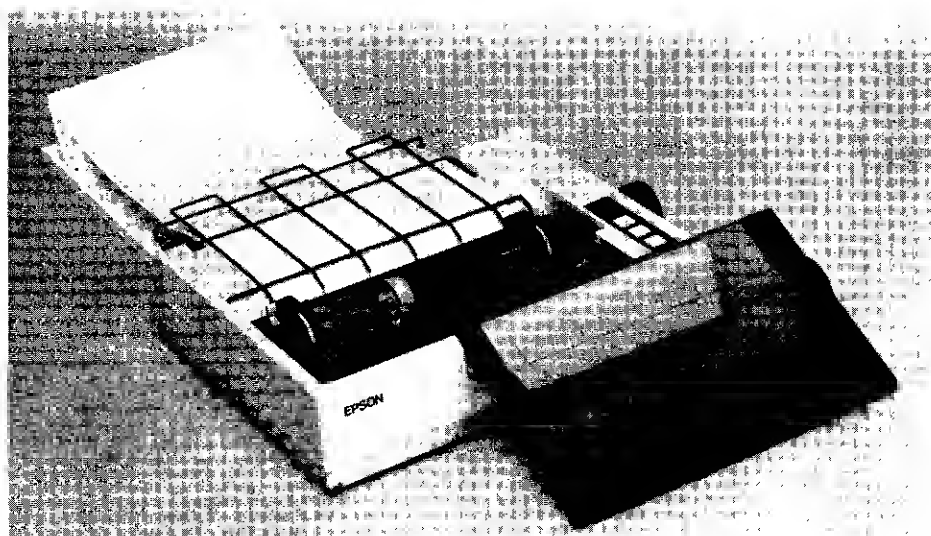


Figure 1-12. Epson MX-80 F/T Printer

Modems

Another very useful peripheral is a *modem* (modulator/demodulator). It allows you to hook up your Apple III to telephone lines to access public databases like Compuserve, Dow Jones News/Retrieval, and The Source, or to swap files with other computer users.

Like so many peripherals, modems come in a variety of “flavors” at a variety of prices. Some are acoustic couplers that have rubber cups into which you place the telephone handset. The Apple III can use many modems designed for the Apple II. They plug directly into the expansion slots inside the computer.

By far the most popular variety of modem is the direct-connect modem, which plugs directly into the phone jack on your wall. Figure 1-13 shows a typical modem set-up.

In order to use a modem, you’ll need special *communications software* (sometimes called a “smart terminal” or “file transfer program”). Apple offers a package called Access III, and many others are on the market. See your local dealer for more information.

Apple II Peripherals

With its special ability to act like an Apple II, the Apple III can also use some of the Apple II peripherals. In particular, since the slots for

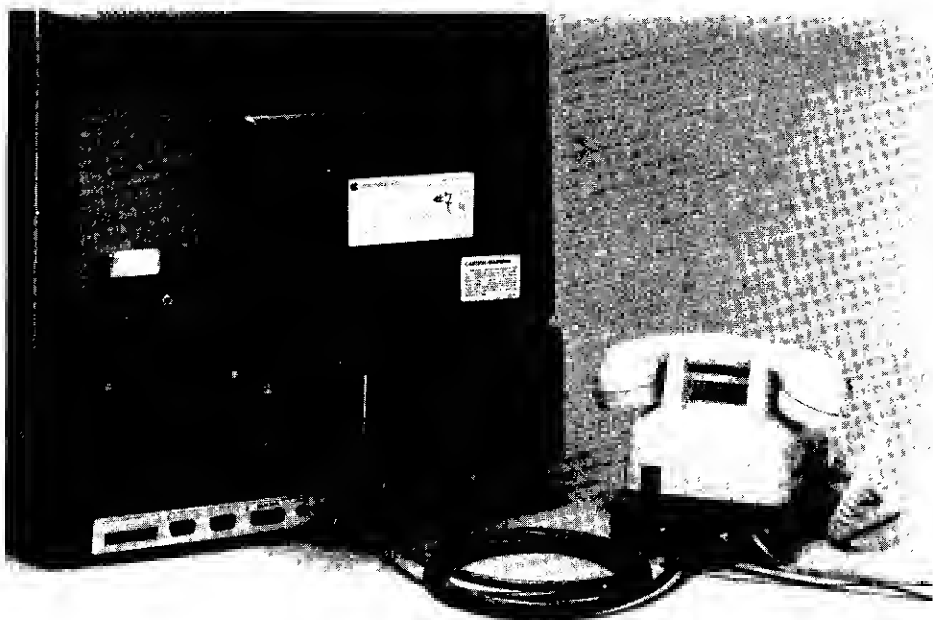


Figure 1-13. Modem with the Apple III

plug-in boards are identical to those in the Apple II, some of the plug-in boards for the Apple II will work in the Apple III.

Note that we said *some*. Because of the hundreds of peripherals and accessories made for the Apple II, it's impossible for us to be specific about which will work and which won't. For instance, you can't use the Apple II Language System (Pascal), although you can adapt most programs to run on the Apple III (as long as you have Apple III Pascal). Also, neither the Apple II Integer BASIC or Applesoft II firmware cards will work. If you're in doubt, the best bet is to see your local Apple dealer.

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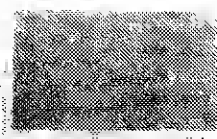
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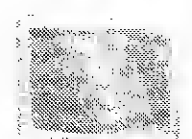
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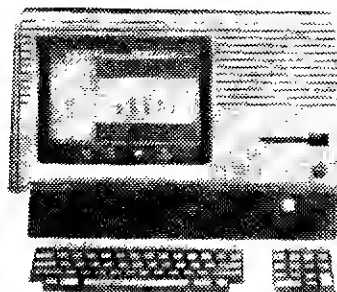


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Getting Started With the Apple III

2

In Chapter 1 we gave you an overview of the Apple III system, its features and capabilities, as well as the hardware, software, and accessories you can buy for it. In this chapter, we'll get down to specifics and the process of setting up and using your Apple III.

First, we'll review getting the system unpacked and set up. (If your system is already set up, skip ahead a few pages to the section of this chapter titled "Using the System.")

UNPACKING THE APPLE

Depending on exactly which combination of the Apple III, peripherals, and software you purchased, you'll have quite a few boxes sitting in front of you. In each box Apple includes a list of the box's contents. Make sure everything is included. (We won't give you a list since the exact contents change from time to time.) If anything is missing, contact the dealer you purchased the computer from or fill out the missing parts form enclosed in the box and send it to the address indicated.

SETTING UP THE SYSTEM

Before you can use the Apple III, you'll need to set up your system. The exact steps you'll need to perform depend upon the system you've purchased; however, the following sections review the usual processes for setting up a system.

Hooking Up the Apple III

All of the connections you'll have to make are located on the rear panel of the Apple III. Place the Apple on a desk or a table with the rear of the computer facing you.

Make sure the ON/OFF switch (located on the right side of the case) is in the OFF position, and plug the AC power cord into the socket located next to the switch (see Figure 2-1). Plug the other end of the cord into the nearest three-wire grounded wall outlet. Make sure that the socket is grounded. A non-grounded outlet is not only dangerous, but can also cause a buildup of static electricity that can disrupt the operation of your Apple III.

Next, connect the video monitor, as shown in Figure 2-2. If you're using a monochromatic monitor (black-and-white, green-and-white, or amber-and-white), you'll be able to use the cable included with the Apple III. One end goes into the socket marked B/W VIDEO on the rear panel of the Apple III and the other plugs into the monitor.

If you're using a color monitor, you'll use the socket on the Apple III marked COLOR VIDEO. If you buy a color monitor, make sure the dealer provides you with the proper cable for hooking up the monitor.

That's all that's required to hook up the basic system. However, if you're like most Apple III owners, you also purchased a few additional devices known as *peripherals*. Let's look at how to hook them up.



Figure 2-1. AC connector at the rear of the Apple III

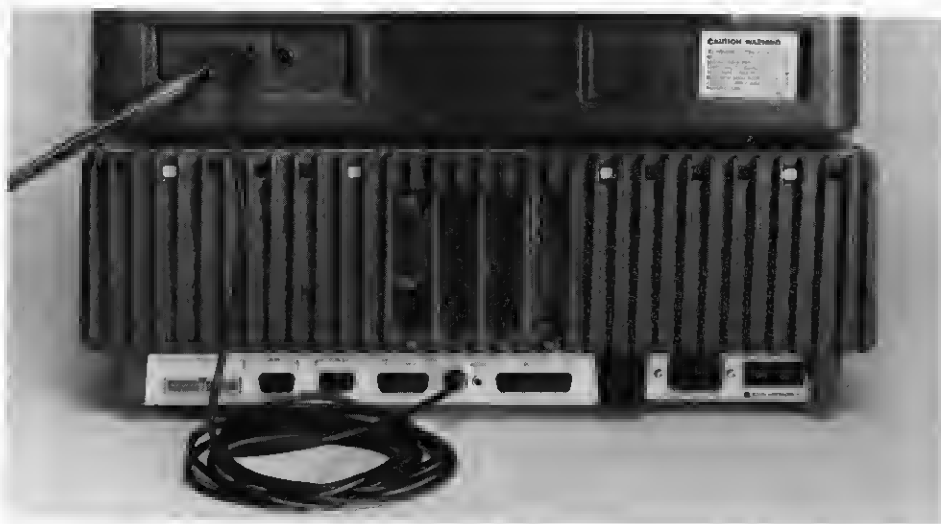


Figure 2-2. Connecting the video monitor

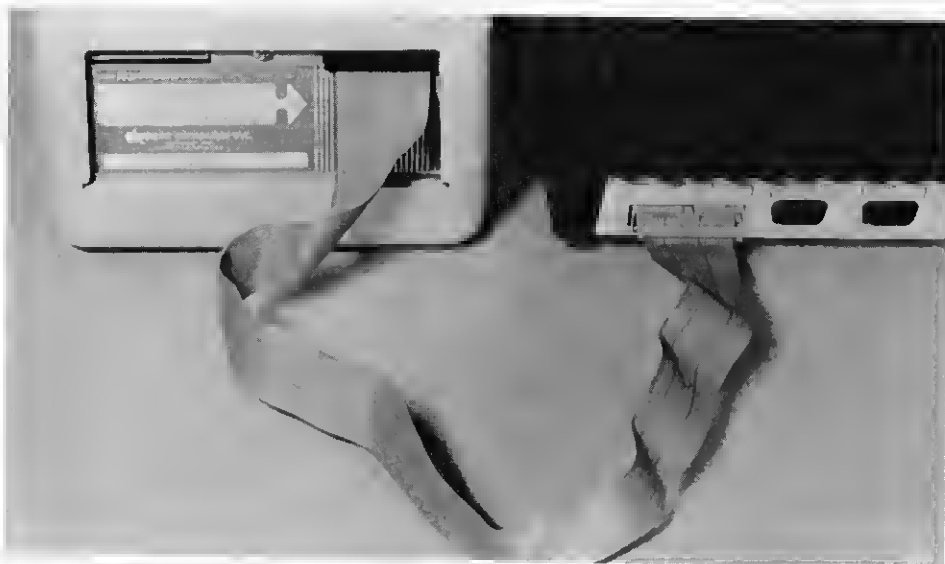


Figure 2-3. Connecting the Apple Disk III

Installing an Apple Disk III

As shown in Figure 2-3, the Apple Disk III plugs into the leftmost socket, marked **FLOPPY DISKS**. This socket also supplies electrical power to the drive so that you don't have to plug it into a wall outlet.

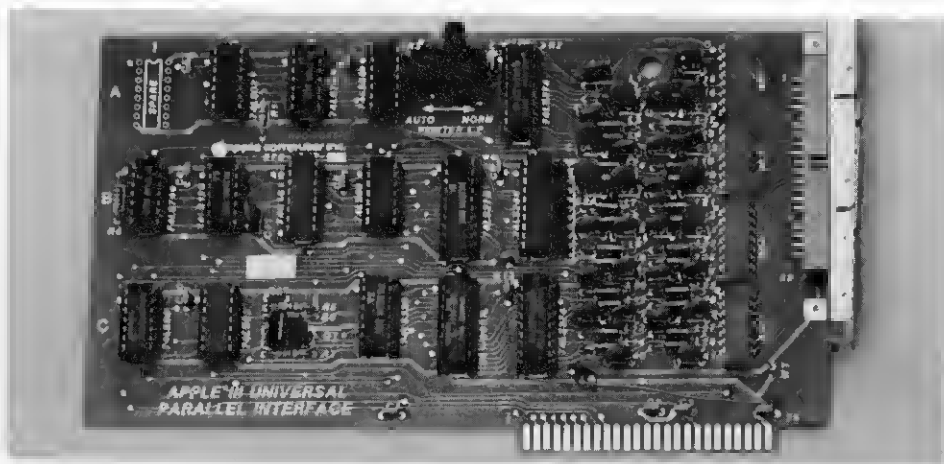


Figure 2-10. Apple Universal Parallel Interface Card

Interface Card (UPIC), shown in Figure 2-10. This card plugs into one of the Apple III's expansion slots and provides a standard way of connecting a parallel interface printer to the Apple III.

Since a number of different printers can be connected to the UPIC, you will need to refer to the UPIC manual in order to properly set up the board. In addition, you will need to install the proper device driver on your operating system disk for the printer you are using (a subject we will cover in Chapter 4).

Installing a Modem

If you'll be using your Apple III to communicate with "information utilities," like The Source or CompuServe, or with other computers through the telephone lines, you probably purchased a modem. Although some modems are designed to plug directly into one of the Apple III's expansion slots, many users buy modems that plug into the Apple III's RS-232-C connector.

USING THE SYSTEM_____

Before you turn on your system, make sure that you've connected everything correctly. When you're sure that all the cables are hooked up to the right places, give the connectors an extra push and wiggle to make sure they're securely connected. Before we explain all the specific

details of using the Apple III and its software, you should familiarize yourself with the basics of using the system. That's easy to do with the System Demonstration disk packed with your computer. Open the drive, slide the disk in with the label up and toward the front of the computer, close the door, and turn the ON/OFF switch (located on the left rear panel) to the ON position.

The disk drive will whirl and click for a few seconds and several messages will appear on the screen. Shortly thereafter, a series of graphics will appear on the monitor. They're designed to show you a few of the capabilities of the system.

If you don't do anything, the demonstration will just go on and on. However, after the graphics have finished, you'll see a list of demonstration programs appear on the screen. This list is called a *menu* because it gives you a list of choices. If you see one that interests you, press the key of the number corresponding to the demonstration. If you do nothing, the graphics will start up again. If, at any point, you want to see the list of choices, press **ESCAPE** and the menu will appear on the screen.

Use the System Demonstration program until you've explored all its possibilities. When you're ready, select option 5 and you will exit from the demonstration.

THE CONSOLE ---

As you use programs designed for the Apple III, you will run across the term *console* quite a few times. The console is the keyboard and the video screen (no matter what type you're using—black-and-white or color).

Just like the dashboard of a car (also called a console), you'll use the Apple III console to *control* the computer with the keyboard and *monitor* what is happening inside the Apple III by reading the messages that appear on the video display.

By far the best way to see how the console works is to use it. The Console Demonstration program is a good way to get used to the Apple III keyboard.

THE APPLE III KEYBOARD ---

The Apple III keyboard (shown in Figure 2-11) closely resembles a keyboard of a standard typewriter. For now, use the keyboard like you would use a typewriter, and don't worry about the special keys.



Figure 2-11. Apple III keyboard

When compared to a typewriter, there are several differences in the way the Apple III handles text. Besides the obvious fact that text appears on a screen rather than on a piece of paper, you don't have to worry about pressing RETURN as you approach the end of the line. The Apple III automatically wraps text around to the next line. Although that sometimes results in a word being split in the middle, it makes no difference to the computer. It still "sees" each word individually. (If you'll be using one of the many word processing programs designed for the Apple III, like Apple Writer III, you'll see the *word wrap* feature, where entire words are wrapped around to the next line so they're not split.)

Correcting Errors

Correcting an error on the Apple III is different from correcting an error on a typewriter. You probably noticed that there isn't a backspace key. You'll use the LEFT ARROW key (←) on the lower right. Type in a few words and move the cursor (the solid square that indicates where you're typing) back a few spaces. You'll notice an important fact: the arrow keys *don't change* what they move over. You can back the cursor up anywhere in the line and type over an error to correct it. This feature is called *typeover*.

Note that if you press RETURN when the cursor is in the middle of a line, everything to the right of the cursor is ignored by the Apple III. For instance, if you're using Business BASIC and you type in

```
)PRINT "The Apple III is an advanced computer."
```

when you press RETURN, you'll see

```
The Apple III is an advanced computer.
```

However, if you use the **LEFT ARROW** key to move the cursor back into the middle of “advanced” and then press **RETURN**, you’ll see

```
The Apple III is an adva
```

Everything to the right of the cursor is ignored.

NOTE: If you’re using Apple III Pascal, there are some important exceptions to the way the cursor works. See Apple’s *Pascal Manual* for details.

Deleting a Whole Line

The Apple III also allows you to erase an entire line (or several lines) if you decide you want to retype. It’s done by holding down the **CONTROL** key and pressing **x**. To see how it works, type the following line and then press **CONTROL** and **x**:

```
The Apple III
```

As soon as you’ve done so, the line will look like this:

```
The Apple III\
```

Even though the line of text is still on the screen, the backslash indicates that it’s been ignored by the Apple III. The cursor moves down to the next line and you can start over again.

Typeahead Buffer

A *buffer* is an area in memory where information is temporarily stored until the computer is ready to use it. If you’re a lightning-fast typist, you can sometimes get ahead of the computer. With many computer systems, you actually lose what you type when the computer is busy doing something else. This is not the case with the Apple III. While the computer is busy, everything you type is stored in the typeahead buffer and fed to the microprocessor as soon as the Apple III is ready. Although that might not sound like a big feature right now, you’ll find it very handy in the future.

APPLE III SYSTEM DISKS

In Chapter 3, we’ll take a long look at the Apple III’s Sophisticated Operating System (SOS). As you’ll soon see, SOS is very powerful and

gives you access to features that until recently have only been available with large computer systems.

As we mentioned briefly in Chapter 1, in order for the system to work you must have the SOS set up (configured) for your particular system. The SOS communicates with individual parts of the system using device drivers—special programs that control the major components. A *system disk* is one that contains the operating system program and the proper device drivers for your particular system.

BOOTING THE SYSTEM

“Boot the system” is one of the most commonly heard terms in the world of computers.

The origins of the term come from a small program that actually starts the computer. It essentially “pulls the system up by its bootstraps.” When you “boot” your Apple III (or any other computer for that matter), all you’re doing is loading a program into memory to get the hardware up and running. In the case of the Apple III, it’s done by inserting a system disk into the built-in disk drive and turning on the power.

DISK CARE

Like the other parts of your computer system, floppy disks are fragile and should be handled with care.

Floppy disks are thin pieces of plastic coated with the same type of magnetic material used on recording tapes. But the similarity ends there. If you inadvertently damage a small part of a music cassette, you can still play the music. However, a floppy disk stores data as hundreds of thousands of tiny areas that are either magnetically charged or not charged, corresponding to the 1s and 0s of the binary numbering system. In most cases, the program is ruined if even one of these bits is damaged. Therefore, there are a few rules you should remember about handling floppy disks.

Environment

Although floppy disks are enclosed in a protective plastic jacket to keep the magnetic surfaces from being easily damaged, you should be very careful to make sure you don’t let your fingers touch the magnetic

areas that show through the protective jacket. Your fingers leave microscopic oil residues that can destroy the magnetic surface.

Also make sure that you replace a disk in its protective envelope when it's not being used. And store your disk in a dust-free, smoke-free environment. Smoke and dust particles can scratch the surface of disks if they get under the surface of the plastic wrapper. (Many dealers sell plastic cases that protect disks from such environmental hazards.)

Finally, make sure your working environment is clean. A computer coated with dust is asking for trouble, since the dust will surely get on the disks. And if you must have your cup of coffee while working on the Apple III, keep it on a separate table—away from the computer and any disks.

Handling

Floppy disks get their name from the fact that they're flexible. But they still should be handled carefully. (If you treat them like they're pieces of glass, you're headed in the right direction.) Remember that they're *coated* with magnetic material. If you flex them or abuse them too much, the coating will flake off, and your data will go into oblivion.

Never force a disk into a disk drive. If it does not go in easily, there's a problem. (A common problem occurs when you attempt to force a disk into a slot already containing another disk.)

Temperature

Temperature is another important consideration. Floppy disks are most comfortable at the same temperatures at which people are comfortable. High temperatures or high humidity can damage them. One of the greatest advantages of today's personal computers, like the Apple III, is that they don't require special climate-controlled rooms like the behemoths of old. But if you're using your computer in a region where high temperatures or high humidity are common, you should buy an air conditioner or dehumidifier. It will make both you and your computer very happy.

Magnetic Fields

Because a magnetic field is used to record the information on your floppy disks, any stray magnetic field of sufficient strength can alter or destroy the data on a floppy disk. You might be surprised to find that

sources of magnetism abound in every office and home. In fact, just about everything that uses electricity produces some sort of magnetic field. It's better to be safe than sorry. Keep your floppy disks away from television sets, telephones (the bell uses a magnet), fans, electric typewriters, and stereo speakers (many of which use *huge* magnets).

MAKING BACKUPS

It's good standard operating procedure to make copies of your software and store the originals away in a safe place. (Some people even use a safe-deposit box.) In fact, the best method is to keep two sets of originals by making backups of the "master" disks, labeling your new disks "working masters," and making backups of them (as shown in Figure 2-12). That way, if something unexpected happens (disk drives have been known to make occasional light lunches of floppy disks), you won't be left without a copy of your program.

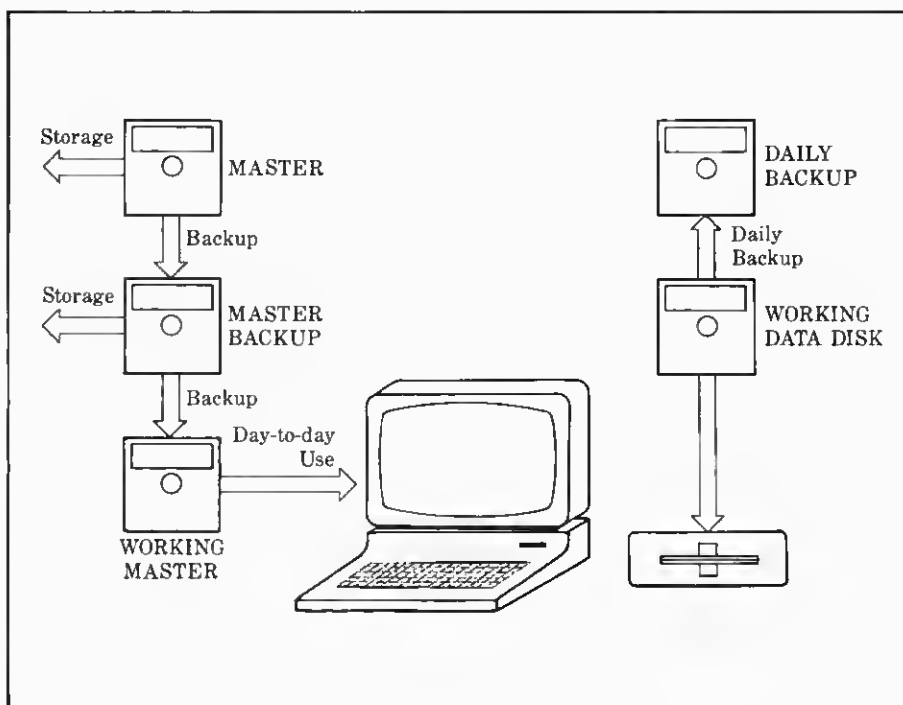


Figure 2-12. Making backup disks

If you're using your Apple III every day, you should make a *daily* backup of your data (as shown in Figure 2-12). Although it looks complicated, it only takes a couple of minutes to copy your work at the end of each day.

You should make backups of the following diskettes that came with your Apple III (disks marked with "*" are optional, depending on which system you purchased):

- System Utilities
- System Utilities Data
- Apple II Emulation
- Apple Business BASIC
- Pascal 1*
- Pascal 3*
- Profile Driver and System Utilities Software*
- Universal Parallel Interface Card Driver Software*

NOTE: Although most of the disks that came with your Apple III can easily be copied, such is not the case with many of the applications programs you'll buy. Many of them are "copy-protected" to prevent people from making copies of very expensive software and distributing them. However, most companies that copy-protect their software make low-cost replacement disks available if the originals are inadvertently ruined.

What You'll Need

If you haven't done so already, purchase at least one box of 5 1/4-inch floppy disks. Ask your dealer for soft sectored, single-sided, single-density disks. (If you have the Unifile or Duofile, you'll need disks specifically designed for these drives. Since they'll *only* fit in these drives, they should be clearly marked "Unifile/Duofile." If in doubt, ask your dealer.) For the standard drives, there's no need to pay the extra money for double-sided or double-density disks. However, buy the best disks you can afford. Although most bargain brands are okay, you should trust your valuable data only to a top-quality disk.

Write-Protection

As you slide a disk into the Apple III's disk drives, you'll notice that there's a square notch cut out from the left side. This is the *write-protect*

notch. When it's covered, the Apple III won't let you erase data that's on the disk or put new data on it. Your master disks should always be write-protected. (Apple master disks come that way.) You can write-protect disks by covering the notches with the peel-off tabs that come with most disks. If you try to copy onto a write-protected disk, the Apple III will tell you (on the screen). Before removing a write-protect tab, make sure you're using the right disk. Once you erase a disk by writing new information onto it, there's no way to bring it back. (That's why you should always make backups.)

Device and Volume Names

Many of the commands (like the COPY command which we will use in a moment) will ask you for the name of the device you will be using. In the case of the COPY command, the *device name* indicates where the data can be found or where the data should be stored.

Device names always start with a "." and are easy to remember. Here are a few:

.CONSOLE	The console (video display/keyboard)
.D1	The built-in disk drive
.D2, .D3, or .D4	Additional disk drives you've added
.PROFILE	The Profile hard disk
.PRINTER	A printer
.PARALLEL	The parallel interface card
.RS232	The RS-232 interface

In addition, when you use storage devices like floppy disk drives, you may use what is called a *volume name* to refer to a particular disk. For instance, the name of the System Utilities disk is /UTILITIES.

Volume names must begin with a slash followed by a letter and can consist of up to 14 additional letters, numbers, or periods; no other punctuation is allowed.

Here are a few legal names:

```
/UTIL.BACKUP
/FORMLETTERS
/MEMOS-1984
```

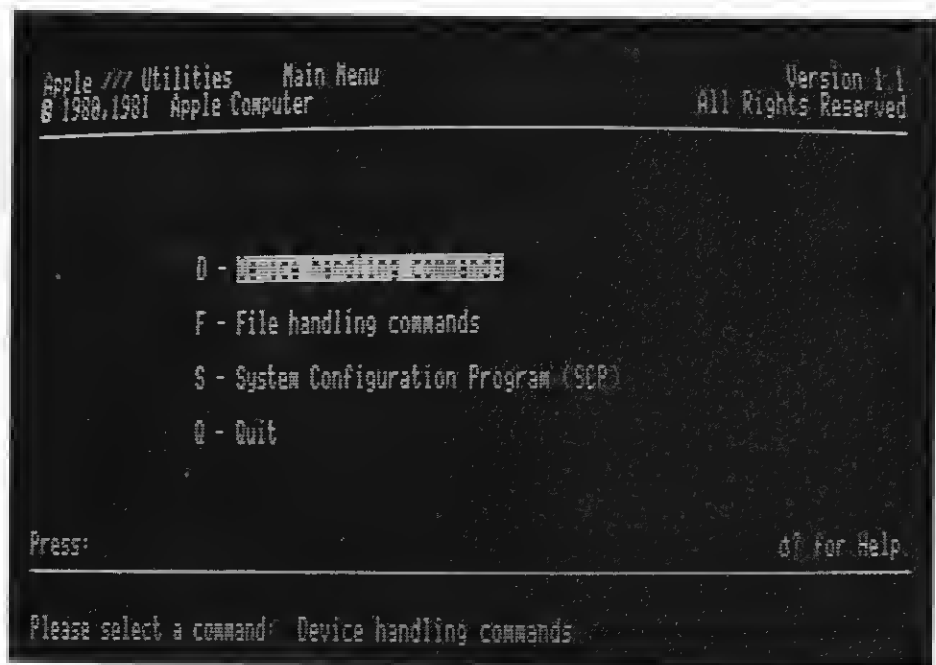



Figure 2-13. Utilities menu

The Backup Process

To show you how the backup process is done, let's back up the System Utilities disk. It's one you'll be using extensively.

If you have a second Disk III drive (or a Unifile or Duofile), backing up disks will be easy and quick. If you'll only be using the built-in drive, it will still be easy, but not as quick. (You'll have to swap disks several times during the backup process.) If you have a second disk drive and haven't connected it yet, do so now.

Make sure the computer is turned off. Place the System Utilities disk into the built-in drive and a blank disk into the second drive (if you have one). Otherwise, keep the blank disk ready.

Turn the Apple III on. In a few seconds, you should see the menu shown in Figure 2-13.

In many of the menus you'll be seeing as you use your Apple III, the highlighted choice on the menu is the one that you'll use most often. We don't want file handling commands this time—we're going to be using the device handling commands. In Apple III parlance, a device is any of the individual parts of the system the operating system communicates

with (video display, keyboard, Profile, Disk III and so on). We want to copy the contents of a whole device (the built-in disk) onto another device (either the same or another disk drive). Press **D** and you'll see the menu shown in Figure 2-14.

This time, the highlighted "Copy one volume onto another" is the right choice, so press **C**.

You should see the following message at the bottom of the screen:

```
Copy the Volume:
[.D2          ]
To the Volume:

With the New Volume Name:
```

The volume name in the brackets is the name of the volume you'll be copying *from*. Since we put the original disk in the built-in drive (which is called **.D1**), we'll have to change it by typing **.D1** and pressing **RETURN**. (If you make a mistake, use the arrow keys to move the cursor back and type in the correct character. If you get hopelessly mixed up, press **ESCAPE** to get you out of the backup program and back into the device handling commands menu.)

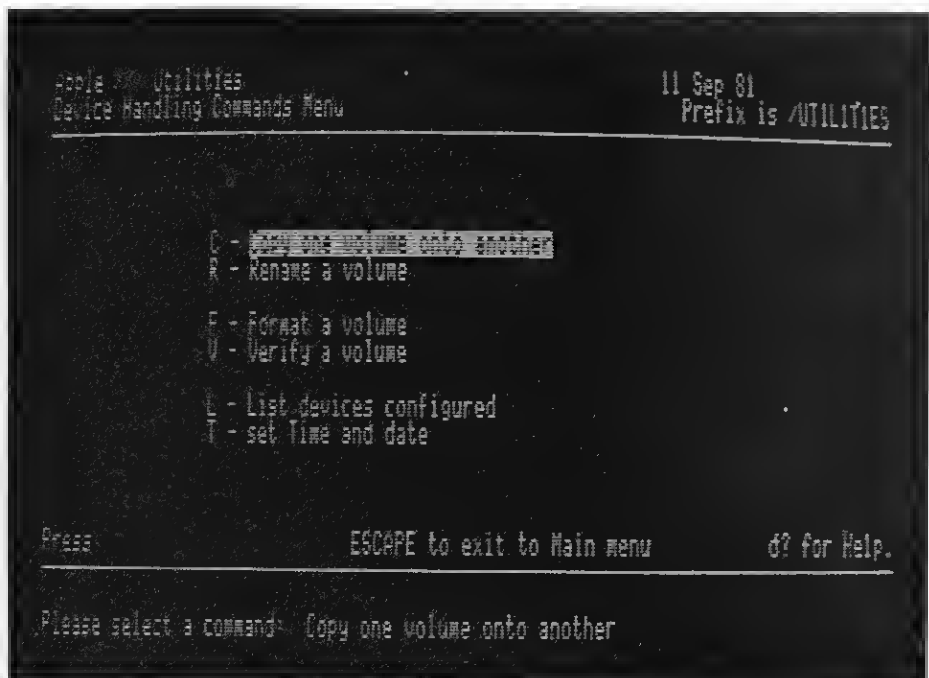


Figure 2-14. Device handling commands menu

Notice that as soon as you entered .D1, the computer automatically filled in .D2 as the volume to copy to. If you have two drives, you're all set. If you don't, enter .D1 as the name of the volume to copy to and press RETURN.

The Apple III assumes that you want your backup to have the same volume name as the original, so it fills the name UTILITIES into the space provided for the new volume name. If, for some reason, you want to change the name, just type the new name over the existing name and press RETURN. Otherwise just press RETURN.

With two disk drives, that's all there is to it. The drives will whir and messages to let you know how the backup operation is proceeding will appear on the screen.

With one disk drive, assuming you've typed .D1 as both the origin and destination drive, the system will prompt you (in a box at the top of the screen) when to insert the *source* volume (the original disk) and the *destination* volume (the blank disk you're copying to). Be forewarned that you'll have to make a number of swaps before the process is finished.

The Apple III first *formats* the disk. This process electrically divides the disk into sections and checks to make sure that it isn't defective. As soon as the disk is formatted, the copying process starts. Depending on the amount of data on the disk, it can take a few seconds or a couple of minutes to completely copy it. A message appears on the screen when the Apple III is done making the backup. At this point, you should remove both disks, file the original in a safe place, and label your copy.

FORMATTING BLANK DISKS_____

The backup process automatically formats a blank disk before copying all the files from the original disk onto the new disk. However, for most applications, you'll need to have a number of blank, formatted disks on hand for storing programs and data. You can use the device handling commands on the System Utilities disk to format the rest of the blank disks you have.

After selecting the device handling commands, press F to format a blank disk. The following message appears on the bottom of the screen:

```
Format the medium of the volume :  
[.D2                               ]  
with the new volume name :
```

Once again, the Apple III assumes you have a second disk drive (.D2) connected to the system and that you've placed the blank disk in it. If you don't have a second disk drive, type .D1 in the space. Then press

RETURN and the cursor will move to the field labeled "with the new volume name."

Suddenly a name appears on your screen. The Apple III will automatically name the disk you're formatting BLANK followed by a number. Since at this point you don't know what you'll be using the disk for, the best bet is to use the name the Apple III assigns to the disk. Press RETURN and the formatting process will proceed. (If you want to give it another name, type it into the space provided.)

NOTE: Once again, if you don't have a second disk drive, the system will instruct you to swap disks a number of times. Also, if you've inadvertently attempted to format a disk that already has information on it, the system will ask you if it's okay to destroy what's there. (The formatting process erases all data on a disk.)

A "formatting complete" message will appear on the screen. Press ESCAPE to get back to the Device Handling Command Menu. Finally, make sure to note on the disk's label that it has been formatted. This eliminates duplication of effort later on.

IF YOU HAVE PROBLEMS

The Apple III utilities such as backup and format have been designed to be easy to use and to lead you step-by-step through the process. If you're doing something incorrectly or there are other problems, you'll generally see a message explaining what the problem is. If you don't understand the error message or still don't know what to do next, see the error messages in Appendix D or Chapter 3, where we'll give you a deeper explanation of using the System Utilities disk.